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Report 32, October-December 1982

(U.S.) Office of Radiation Programs
Washington, DC

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Environmental Radiation Data (ERD) is compiled and distributed quarterly by the Office of Radiation Programs Eastern Environmental Radiation Facility (EERF), Montgomery, Alabama. Data from the similar networks operated by contributing States, Canada, Mexico, and the Pan American Health Organization are reported in (ERD) when available. The ERAMS is comprised of nationwide sampling stations that provide air, surface and drinking water and milk samples from which environmental radiation levels are derived. The major emphasis for ERAMS is toward identifying trends in the accululation of long-lived radionuclides in the environment. The radiation analyses for fission products and specific analyses for uranium, plutonium, strontium, iodine, radium, krypton and tritium. This monitoring effort also serves to provide ancillary information on releases into the environment from stationary sources such as nuclear power reactors, fuel fabrication and reprocessing plants and natural background levels.

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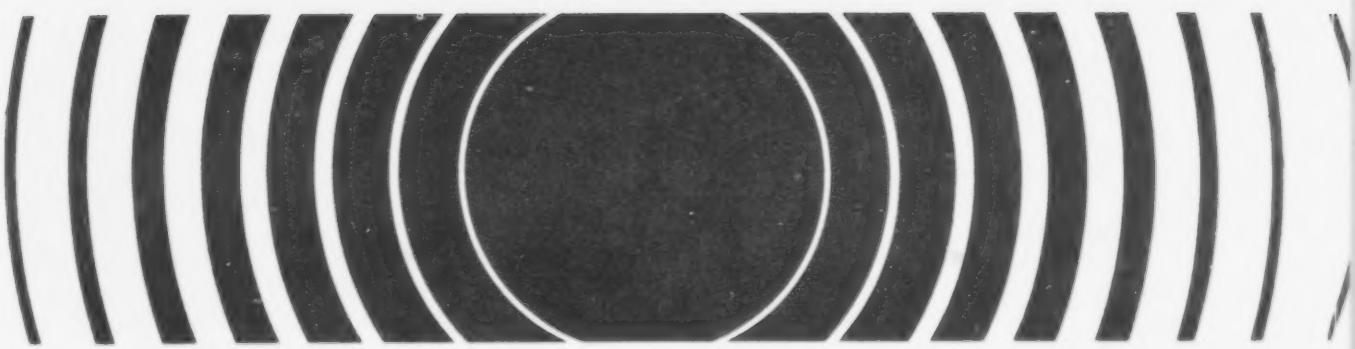

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E N V I R O N M E N T A L

R A D I A T I O N

D A T A

REPORT 32

October - December 1982

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Office of Radiation Programs

Preface

Environmental Radiation Data (ERD) is compiled and distributed quarterly by the Office of Radiation Programs' Eastern Environmental Radiation Facility (EERF), Montgomery, Alabama. Data from the Environmental Radiation Ambient Monitoring System (ERAMS), and similar networks operated by contributing States, Canada, Mexico, and the Pan American Health Organization are reported in (ERD) when available.

ERAMS was established in 1973 by the U. S. Environmental Protection Agency's Office of Radiation Programs (ORP). The ERAMS is comprised of nationwide sampling stations that provide air, surface, and drinking water and milk samples from which environmental radiation levels are derived. The major emphasis for ERAMS is toward identifying trends in the accumulation of long-lived radionuclides in the environment.

1. Sampling locations are selected to provide optimal population coverage while functioning to monitor fallout from nuclear devices and other forms of radioactive contamination of the enviromnent.

2. The radiation analyses performed on these samples include gross alpha and gross beta levels, gamma analyses for fission products and specific analyses for uranium, plutonium, strontium, iodine, radium, krypton and tritium. This monitoring effort also serves to provide ancillary information on releases into the environment from stationary sources such as nuclear power reactors, fuel fabrication and reprocessing plants and natural background levels.

E N V I R O N M E N T A L R A D I A T I O N

D A T A

CONTENTS

	Page
DATA - Reporting Rationale and Procedures	iii
- Table of Reporting Increments and Minimum Detectable Levels	v
DATA - ERAMS	
SECTION I. Air Program	1
1. Airborne Particulates and Precipitation	1
2. Plutonium and Uranium in Airborne Particulates and Precipitation	11
3. Krypton-85	13
SECTION II. Water Program	14
1. Surface Water	14
2. Drinking Water	17
3. Radon in Drinking Water	20
SECTION III. External Gamma Ambient Monitoring Program	21

SECTION IV. Milk Program 24

1. Pasteurized Milk 24

2. Tritium in Milk 24

3. Carbon-14 in Milk 32

DATA - STATE AGENCIES 33

1. Indiana Pasteurized Milk Program 33

2. Iowa Water Analysis and Milk Analysis 38

DATA - Reporting Rationale and Procedures

The intent of EPA's Office of Radiation Programs in establishing the Environmental Radiation Ambient Monitoring System was to provide continuous, accurate and usable environmental radiation data for the public. Therefore, new data reporting procedures were developed to allow better interpretation of the data. The most significant change in this reporting procedure is that all specific radionuclide analyses will be reported as the counting results indicate, whether the number is negative, zero, or positive.

Reporting Rationale

Frequently, concentrations of a radionuclide in environmental media are close to zero. When the actual concentration of a nuclide is zero, the net counting results should statistically show a distribution of negative and positive numbers about zero. This occurs when the background count is subtracted from a sample which has only background activity. Prior to July 1975, ERAMS data were not reported numerically when the results were less than a specified reporting level or minimum detectable level. The present reporting procedure allows all the data to be reported and evaluated statistically without an arbitrary cutoff of small or negative numbers. This approach will facilitate estimates of bias in the nuclide analyses and will allow better evaluation of distributions and trends in environmental data.

When reviewing the data in this report, caution should be exercised in the interpretation of individual negative values. Obviously, a negative activity value does not have physical significance. Such numbers, however, are significant when taken together with other observations which indicate that the true value of a distribution is near zero. When an average of several measurements produces a result less than zero, this indicates a negative bias in the measurement procedure.

(1) Reported Values

Specific Analyses - All specific radionuclide analyses will be reported as the counting results indicate, whether the number is negative, zero, or positive. Numerical values given are as of sample collection date.

Gross Analyses - The actual value of gross radioactivity measurements will be reported, unless the value is below the minimum detectable level (MDL) at the 2 sigma confidence level, then < minimum detectable level will be reported.

MDL is defined as the 3 sigma error of the background. A tabulation of MDL's is given in the following table.

(2) Reported Error Terms

Each reported value for specific analyses will be accompanied by a counting error term at the 2 sigma (95%) confidence interval. Potassium concentrations are determined by specific activity analyses. Error terms are therefore reported as counting errors. At the very low levels characteristic of most ERAMS measurements, counting error is the greatest contributor to overall error.

(3) Significant Figures

All reported values will be rounded to no more than three significant figures. The last significant figure will be increased by one if the figure following is five or greater, otherwise it is left unchanged.

(4) Reporting Levels

The reporting units, smallest increments for reporting, and minimum detectable levels for each isotope are shown in table 1. Smallest increments are sometimes considerably smaller than minimum detectable amounts to avoid truncation errors in averaging.

(5) Averages

Averages will be calculated along with appropriate error terms in an annual summary and analysis of ERAMS data. In calculating these averages, all values of individual data including negative numbers will be utilized. Averages will not be included in ERD quarterly reports.

TABLE 1

ERAMS Reporting Increments and Minimum Detectable Levels

for Radionuclide Analyses

Radionuclide	Media	Reporting Units	Reporting Increments	Minimum Detectable Levels
Gross alpha	Water	pCi/l	1 pCi/l	2 pCi/l
Gross beta	Air	pCi/m^3	.01 pCi/m^3	.01 pCi/m^3
	Water	pCi/l	1 pCi/l	1 pCi/l
	Precipitation	nCi/m^2	.01 nCi/m^2	.01 nCi/m^2(a)
Tritium	Water	nCi/l	.1 nCi/l	.2 nCi/l
	Milk	nCi/l	.1 nCi/l	.2 nCi/l
Carbon-14	Milk	pCi/l	1 pCi/l	15 pCi/l
Krypton-85	Ambient Air	pCi/m^3	.1 pCi/m^3	2 pCi/m^3
Plutonium-238, 239	Air	aCi/m^3	.1 aCi/m^3	.015 pCi(b) per sample
	Milk	pCi/l	.001 pCi/l	.015 pCi per sample
	Water	pCi/l	.001 pCi/l	.015 pCi per sample
Uranium-234, 235,238	Air	aCi/m^3	.1 aCi/m^3	.015 pCi(b) per sample
	Milk	pCi/l	.001 pCi/l	.015 pCi per sample
	Water	pCi/l	.001 pCi/l	.015 pCi per sample
Radium-226	Water	pCi/l	.1 pCi/l	.1 pCi/l
Strontium-90	Milk	pCi/l	.1 pCi/l	1 pCi/l
	Water	pCi/l	.1 pCi/l	1 pCi/l

Radionuclide	Media	Reporting Units	Reporting Increments	Minimum Detectable Levels
Strontium-89	Milk	pCi/l	1 pCi/l	5 pCi/l(c)
Iodine-131	Milk	pCi/l	1 pCi/l	10 pCi/l(c)
	Water	pCi/l	1 pCi/l	10 pCi/l(c)
	Water (specific radiochemical analysis)	pCi/l	.1 pCi/l	.4 pCi/l
Iodine-129	Milk	fCi/l	.1 fCi/l	.4 fCi/l
Iodine-127	Milk	g/l	10 g/l	10 g/l
Cesium-137	Milk	pCi/l	1 pCi/l	10 pCi/l
	Water	pCi/l	1 pCi/l	10 pCi/l
Barium-140	Milk	pCi/l	1 pCi/l	10 pCi/l(c)
	Water	pCi/l	1 pCi/l	10 pCi/l(c)
Potassium	Milk	g/l	.1 g/l	.12 g/l
	Water	g/l	.1 g/l	.12 g/l
Potassium-40	Water	pCi/l	1 pCi/l	100 pCi/l

(a) The value in terms of nCi/m^2 would be dependent on precipitation (mm).
(b) This value in terms of pCi/m^3 would be dependent on the air volume.
(c) Activity as of the day of counting.

ENVIRONMENTAL RADIATION AMBIENT MONITORING SYSTEM (ERAMS)

SECTION I. Air Program

Airborne Particulates and Precipitation

Gross beta radioactivity measurements and certain specific analyses are performed on air particulates and precipitation samples as indicator measurements in assessing the general (national) impact of all contributing sources on environmental levels of radiation.

Airborne particulates are collected continuously at field stations representing wide geographic coverage, including present and potential sources of environmental radioactivity. Sampling sites are located throughout the United States, Virgin Islands, and the Panama Canal.

Filters (10-cm diameter synthetic fiber) from air samplers are changed twice weekly and field measurements are made with a G-M survey meter at 5 hours and 29 hours after collection to allow for radon and thoron daughter product decay. Field estimates are reported to appropriate EPA officials by telephone or mail depending on the activity levels found.

The filters are sent to EERF for more sensitive analyses in a low background beta counter. Gamma scans are performed on all filters showing laboratory gross beta counts greater than 1 pCi/m^3. The lower gross beta values reported for laboratory measurements are largely due to the decay of radionuclides which occurred between the times of the field estimates and laboratory measurements.

Precipitation samples are collected at the field stations where air filters are collected. These samples are also sent to EERF where they are composited monthly for tritium, gross beta activity measurements and gamma scans.

These locations also correspond to airborne particulate and drinking water sampling locations selected for plutonium analyses. Plutonium-238, -239, and uranium-234, -235, and -238 analyses are performed annually on precipitation samples collected during March - May.

Tables 2 - 4 present the monthly average gross beta concentrations in airborne particulates for October - December 1982.

Tables 5 - 7 present the monthly average gross beta concentration in precipitation October - December 1982.

The specific gamma results will be published when they are available.

A compilation of individual measurements is available from the EPA, EERF, Montgomery, AL 36193.

The tritium in precipitation samples for October - December 1982 at the selected stations are shown in Table 8.

TABLE 2

AIRBORNE PARTICULATES
GROSS BETA CONCENTRATION
OCTOBER 1982

AIRBORNE PARTICULATES

LOCATION	# SAM	5-HR FIELD ESTIMATE			EERF LAB MEASUREMENT		
		MAX	MIN	AVG	MAX	MIN	AVG
		(pCi/m^3)			(pCi/m^3)		
AL:MONTGOMERY	9	1.5	0.2	0.7	0.06	0.01	0.02
CA:BERKELEY	9	0.1	0.1	0.1	0.04	0.00	0.02
CA:LOS ANGELES	9	1.2	0.4	0.8	0.05	0.01	0.02
CT:HARTFORD	8	0.6	0.1	0.3	0.01	0.01	0.01
DE:WILMINGTON	8	0.3	0.0	0.1	0.05	0.01	0.02
FL:MIAMI	9	0.0	0.0	0.0	0.01	0.00	0.01
HI:HONOLULU	8	0.3	0.1	0.1	0.01	0.00	0.00
IA:IOWA CITY	8	0.6	0.0	0.3	0.09	0.00	0.02
ID:BOISE	8	1.4	0.1	0.5	0.02	0.00	0.01
ID:IDAHO FALLS	8	0.0	0.0	0.0	0.02	0.01	0.01
IL:CHICAGO	9	1.1	0.2	0.6	0.04	0.01	0.03
ME:AUGUSTA	8	0.6	0.2	0.3	0.02	0.00	0.01
MO:JEFFERSON CITY	9	1.0	0.1	0.4	0.07	0.01	0.02
MS:JACKSON	5	0.5	0.1	0.3	0.03	0.00	0.01
ND:BISMARCK	9	0.8	0.1	0.4	0.03	0.00	0.01
NH:CONCORD	9	13.0	0.4	3.5	0.04	0.00	0.01
NJ:TRENTON	8	0.5	0.1	0.3	0.06	0.00	0.01
NM:SANTA FE	7	1.0	0.3	0.6	0.06	0.01	0.02
NV:LAS VEGAS	6	1.4	0.2	0.8	0.04	0.01	0.02
NY:ALBANY	9	1.4	0.0	0.4	0.04	0.01	0.02
NY:NEW YORK CITY	9	0.3	0.1	0.2	0.06	0.01	0.02
NY:NIAGARA FALLS	9	0.2	0.1	0.1	0.02	0.01	0.01
NY:SYRACUSE	8	0.4	0.0	0.2	0.03	0.01	0.02
OH:COLUMBUS	8	1.2	0.2	0.6	0.04	0.01	0.02
OH:PAINESVILLE	9	0.9	0.2	0.4	0.06	0.01	0.02
OH:TOLEDO	8	2.6	0.3	0.8	0.09	0.00	0.03
OR:PORTLAND	9	0.0	0.0	0.0	0.02	0.00	0.01
PA:HARRISBURG	12	1.8	0.3	0.9	0.06	0.01	0.02
PA:PITTSBURGH	9	0.8	0.3	0.6	0.03	0.01	0.02
RI:PROVIDENCE	6	0.7	0.1	0.3	0.02	0.01	0.01
SC:BARNWELL	1	0.7	0.1	0.1	0.02	0.01	0.01
SC:COLUMBIA	9	1.4	0.2	0.6	0.07	0.01	0.03
SD:PIERRE	8	0.7	0.0	0.5	0.03	0.01	0.02
TX:AUSTIN	8	1.9	0.4	1.3	0.04	0.01	0.02
TX:EL PASO	8	1.4	0.3	0.7	0.06	0.01	0.03
VA:LYNCHBURG	9	1.4	0.0	0.3	0.03	0.01	0.01
WA:SEATTLE	8	0.1	0.0	0.0	0.01	0.00	0.00
WA:SPOKANE	7	5.2	0.2	1.0	0.02	0.00	0.01
WI:MADISON	7	0.5	0.1	0.3	0.02	0.00	0.01
WY:CHEYENNE	1	2.5	0.2	2.5	0.01	0.01	0.01

MINIMUM DETECTABLE LIMIT FOR FIELD ESTIMATES - .1 pCi/m^3
MINIMUM DETECTABLE LIMIT FOR LAB MEASUREMENT - .01 pCi/m^3

TABLE 3

AIRBORNE PARTICULATES
GROSS BETA CONCENTRATION
NOVEMBER 1982

AIRBORNE PARTICULATES

LOCATION	# SAM	5-HR FIELD ESTIMATE			EERF LAB MEASUREMENT		
		MAX	MIN	AVG	MAX	MIN	AVG
		(pCi/m^3)			(pCi/m^3)		
AL:MONTGOMERY	9	1.1	0.2	0.5	0.02	0.01	0.01
CA:BERKELEY	9	0.2	0.0	0.1	0.02	0.01	0.01
CA:LOS ANGELES	9	1.1	0.1	0.7	0.03	0.00	0.02
CT:HARTFORD	9	0.3	0.1	0.2	0.02	0.01	0.01
DE:WILMINGTON	9	0.4	0.1	0.2	0.01	0.01	0.01
FL:MIAMI	4	0.0	0.0	0.0	0.01	0.00	0.00
HI:HONOLULU	9	0.2	0.0	0.1	0.01	0.00	0.01
IA:IOWA CITY	9	0.9	0.1	0.4	0.04	0.01	0.02
ID:BOISE	9	0.6	0.0	0.2	0.02	0.00	0.01
ID:IDAHO FALLS	9	0.0	0.0	0.0	0.02	0.00	0.01
IL:CHICAGO	2	0.3	0.1	0.2	0.02	0.01	0.01
ME:AUGUSTA	9	0.8	0.1	0.2	0.03	0.01	0.01
MO:JEFFERSON CITY	9	0.5	0.1	0.2	0.02	0.01	0.01
ND:BISMARCK	9	0.6	0.1	0.3	0.03	0.01	0.02
NH:CONCORD	8	6.9	0.1	2.3	0.02	0.01	0.01
NJ:TRENTON	7	0.4	0.1	0.3	0.02	0.00	0.01
NM:SANTA FE	6	0.5	0.1	0.3	0.01	0.01	0.01
NV:LAS VEGAS	9	1.1	0.2	0.8	0.02	0.01	0.01
NY:ALBANY	9	0.7	0.0	0.2	0.03	0.01	0.02
NY:NEW YORK CITY	9	0.2	0.1	0.1	0.02	0.01	0.01
NY:NIAGARA FALLS	7	0.2	0.0	0.1	0.02	0.01	0.01
NY:SYRACUSE	9	0.4	0.0	0.1	0.03	0.01	0.01
OH:COLUMBUS	9	0.6	0.1	0.3	0.03	0.01	0.01
OH:PAINESVILLE	9	0.4	0.1	0.2	0.02	0.01	0.01
OH:TOLEDO	9	1.3	0.1	0.5	0.02	0.01	0.01
OR:PORTLAND	9	0.0	0.0	0.0	0.02	0.00	0.01
PA:HARRISBURG	13	1.4	0.2	0.6	0.03	0.01	0.02
PA:PITTSBURGH	8	0.5	0.2	0.3	0.02	0.01	0.01
RI:PROVIDENCE	5	0.5	0.1	0.2	0.02	0.00	0.01
SC:BARNWELL	2	0.0	0.0	0.0	0.01	0.01	0.01
SC:COLUMBIA	8	1.3	0.1	0.5	0.05	0.01	0.02
SD:PIERRE	8	0.8	0.4	0.6	0.02	0.01	0.02
TN:NASHVILLE	12	17.9	0.2	4.8	0.04	0.01	0.02
TX:AUSTIN	9	2.7	0.4	1.1	0.02	0.01	0.01
TX:EL PASO	2	1.1	0.6	0.9	0.02	0.01	0.01
VA:LYNCHBURG	8	0.9	0.0	0.4	0.05	0.01	0.02
WA:SEATTLE	8	0.2	0.0	0.1	0.01	0.00	0.01
WA:SPOKANE	9	0.3	0.1	0.2	0.02	0.00	0.01
WI:MADISON	9	0.6	0.1	0.2	0.02	0.00	0.01

MINIMUM DETECTABLE LIMIT FOR FIELD ESTIMATES - .1 pCi/m^3
MINIMUM DETECTABLE LIMIT FOR LAB MEASUREMENT - .01 pCi/m^3

TABLE 4

AIRBORNE PARTICULATES
GROSS BETA CONCENTRATION
DECEMBER 1982

AIRBORNE PARTICULATES

LOCATION	# SAM	5-HR FIELD ESTIMATE			EERF LAB MEASUREMENT		
		MAX	MIN	AVG	MAX	MIN	AVG
		(pCi/m^3)			(pCi/m^3)		
AL:MONTGOMERY	9	0.5	0.1	0.2	0.01	0.00	0.01
CA:BERKELEY	9	0.2	0.0	0.1	0.02	0.00	0.01
CA:LOS ANGELES	9	1.0	0.2	0.7	0.05	0.01	0.02
CT:HARTFORD	9	0.2	0.1	0.1	0.02	0.01	0.01
DE:WILMINGTON	9	0.1	0.0	0.0	0.01	0.01	0.01
FL:MIAMI	9	0.1	0.0	0.0	0.01	0.00	0.00
HI:HONOLULU	9	0.2	0.0	0.1	0.01	0.00	0.00
IA:IOWA CITY	9	0.6	0.0	0.2	0.02	0.01	0.02
ID:BOISE	8	0.2	0.0	0.1	0.03	0.00	0.01
ID:IDAHO FALLS	9	0.0	0.0	0.0	0.02	0.00	0.01
IL:CHICAGO	9	0.5	0.0	0.2	0.02	0.01	0.01
ME:AUGUSTA	8	0.3	0.0	0.2	0.02	0.01	0.01
MO:JEFFERSON CITY	9	0.3	0.0	0.1	0.02	0.01	0.01
ND:BISMARCK	9	1.3	0.1	0.3	0.02	0.01	0.02
NH:CONCORD	9	4.8	0.3	1.7	0.02	0.01	0.01
NJ:TRENTON	5	0.3	0.0	0.1	0.01	0.00	0.01
NM:SANTA FE	6	0.3	0.1	0.2	0.01	0.01	0.01
NV:LAS VEGAS	9	2.5	0.1	1.2	0.02	0.00	0.01
NY:ALBANY	7	0.3	0.0	0.1	0.02	0.01	0.01
NY:NEW YORK CITY	9	0.2	0.1	0.1	0.02	0.01	0.01
NY:NIAGARA FALLS	9	0.1	0.0	0.1	0.01	0.01	0.01
NY:SYRACUSE	4	0.1	0.0	0.1	0.02	0.01	0.01
OH:COLUMBUS	8	0.3	0.1	0.2	0.02	0.00	0.01
OH:PAINESVILLE	9	0.2	0.0	0.1	0.01	0.01	0.01
OH:TOLEDO	8	0.5	0.0	0.3	0.02	0.01	0.02
OR:PORTLAND	9	0.0	0.0	0.0	0.02	0.00	0.01
PA:HARRISBURG	13	0.9	0.1	0.3	0.03	0.00	0.01
PA:PITTSBURGH	9	0.4	0.1	0.2	0.02	0.01	0.01
RI:PROVIDENCE	7	0.3	0.0	0.2	0.01	0.01	0.01
SC:BARNWELL	3	0.1	0.0	0.0	0.01	0.00	0.01
SC:COLUMBIA	9	1.1	0.2	0.4	0.05	0.01	0.02
SD:PIERRE	9	1.2	0.2	0.6	0.04	0.01	0.02
TN:NASHVILLE	18	0.0	0.0	0.0	0.05	0.00	0.02
TX:AUSTIN	9	1.8	0.6	0.9	0.03	0.01	0.02
VA:LYNCHBURG	7	0.3	0.0	0.1	0.02	0.01	0.01
WA:SEATTLE	7	0.0	0.0	0.0	0.01	0.00	0.01
WA:SPOKANE	9	0.1	0.0	0.1	0.02	0.00	0.01
WI:MADISON	9	0.3	0.0	0.1	0.01	0.01	0.01

MINIMUM DETECTABLE LIMIT FOR FIELD ESTIMATES - .1 pCi/m^3
MINIMUM DETECTABLE LIMIT FOR LAB MEASUREMENT - .01 pCi/m^3

TABLE 5

GROSS BETA CONCENTRATION IN PRECIPITATION

OCTOBER 1982

LOCATION	DEPTH	ACT. ± 2s		SPECIFIC GAMMA ACT.
	(mm)	(nCi/m^2)		(pCi/l)
AL:MONTGOMERY	41.3	0.08	0.02	ND
CA:BERKELEY	10.8	0.01	0.01	ND
CO:DENVER	34.3	0.02	0.01	ND
CT:HARTFORD	25.2	0.08	0.02	ND
ID:BOISE	20.9	0.05	0.01	ND
ID:IDAHO FALLS	18.0	0.03	0.01	ND
IL:CHICAGO	14.1	0.04	0.01	ND
MI:LANSING	22.0	0.03	0.01	ND
MS:JACKSON	10.8	0.02	0.01	ND
ND:BISMARCK	126.0	0.19	0.07	ND
NJ:TRENTON	36.0	0.09	0.02	ND
NY:NEW YORK CITY	10.0	0.00	0.00	ND
NY:NIAGARA FALLS	22.3	0.01	0.01	ND
OH:COLUMBUS	10.0	0.01	0.00	ND
OH:PAINESVILLE	34.4	0.05	0.02	ND
OR:PORTLAND	106.6	0.13	0.05	ND
PA:HARRISBURG	42.5	0.04	0.02	ND
SC:COLUMBIA	51.3	0.07	0.03	ND
TX:AUSTIN	16.5	0.01	0.01	ND
VA:LYNCHBURG	29.5	0.25	0.03	ND

ND NO GAMMA ACTIVITY DETECTABLE
s SIGMA COUNTING ERROR

TABLE 6

GROSS BETA CONCENTRATION IN PRECIPITATION

NOVEMBER 1982

LOCATION	DEPTH	ACT. ± 2s		SPECIFIC GAMMA ACT.
	(mm)	(nCi/m^2)		(pCi/l)
AL:MONTGOMERY	145.0	0.21	0.07	ND
CA:BERKELEY	35.8	0.01	0.02	ND
CO:DENVER	19.3	0.05	0.01	ND
CT:HARTFORD	35.0	0.04	0.02	ND
ID:BOISE	56.5	0.10	0.03	ND
IL:CHICAGO	22.5	0.08	0.02	ND
MI:LANSING	93.1	0.07	0.04	ND
ND:BISMARCK	10.0	0.02	0.01	ND
NY:NEW YORK CITY	22.5	0.01	0.01	ND
NY:NIAGARA FALLS	73.4	0.06	0.03	ND
OH:COLUMBUS	109.5	0.12	0.05	ND
OH:PAINESVILLE	145.5	0.52	0.09	ND
OR:PORTLAND	70.3	0.07	0.03	ND
PA:HARRISBURG	66.8	0.05	0.03	ND
PA:PITTSBURGH	39.0	0.09	0.03	ND
SC:BARNWELL	27.5	0.12	0.02	ND
SC:COLUMBIA	66.5	0.05	0.03	ND
TX:AUSTIN	8.7	0.01	0.00	ND
VA:LYNCHBURG	108.3	0.77	0.09	ND

ND NO GAMMA ACTIVITY DETECTABLE
s SIGMA COUNTING ERROR

TABLE 7

GROSS BETA CONCENTRATION IN PRECIPITATION

DECEMBER 1982

LOCATION	DEPTH	ACT. ± 2s		SPECIFIC GAMMA ACT.
	(mm)	(nCi/m^2)		(pCi/l)
AL:MONTGOMERY	157.5	0.05	0.08	ND
CA:BERKELEY	15.6	0.01	0.01	ND
CO:DENVER	8.4	0.02	0.01	ND
CT:HARTFORD	7.8	0.02	0.00	ND
ID:BOISE	66.3	0.09	0.03	ND
ID:IDAHO FALLS	83.0	0.08	0.04	ND
IL:CHICAGO	145.9	0.04	0.05	ND
MI:LANSING	81.6	0.07	0.04	ND
ND:BISMARCK	11.3	0.06	0.01	ND
NJ:TRENTON	11.3	0.00	0.00	ND
NV:LAS VEGAS	5.0	0.01	0.00	ND
NY:NEW YORK CITY	21.0	0.02	0.01	ND
NY:NIAGARA FALLS	8.0	0.00	0.00	ND
OH:COLUMBUS	49.3	0.05	0.02	ND
OH:PAINESVILLE	91.8	0.51	0.07	ND
OR:PORTLAND	274.5	0.37	0.13	ND
PA:HARRISBURG	33.8	0.02	0.01	ND
SC:BARNWELL	45.0	0.03	0.02	ND
SC:COLUMBIA	113.8	0.21	0.07	ND
VA:LYNCHBURG	39.4	0.08	0.02	ND

ND NO GAMMA ACTIVITY DETECTABLE
s SIGMA COUNTING ERROR

TABLE 7.1

GROSS BETA CONCENTRATION IN PRECIPITATION

JULY 1982

LOCATION	DEPTH (mm)	ACT. ± 2s* (nCi/m^2)		SPECIFIC GAMMA ACT. (pCi/l)
OH:COLUMBUS	39.4	0.04	0.02	^{214}Bi 45 ± 87%
OR:PORTLAND	22.2	0.15	0.02	^{106}Ru 51 ± 75%
				^{7}Be 37 ± 61%
PA:PITTSBURGH	40.0	0.08	0.02	^{214}Bi 48 ± 82%
VA:LYNCHBURG	98.4	0.36	0.06	^{232}Th 32 ± 94%
AUGUST 1982				
OR:PORTLAND	25.0	0.12	0.02	^{7}Be 4.7 ± 52%

* s = SIGMA COUNTING ERROR

TABLE 8

PRECIPITATION
TRITIUM CONCENTRATION

OCTOBER - DECEMBER 1982

LOCATION	OCTOBER nCi/l ± 2s	NOVEMBER nCi/l ± 2s	DECEMBER nCi/l ± 2s
AL:MONTGOMERY	0.2 0.2	0.1 0.2	0.3 0.2
CA:BERKELEY	0.2 0.2	0.1 0.2	0.4 0.2
CO:DENVER	0.3 0.2	0.1 0.2	0.3 0.2
CT:HARTFORD	0.3 0.2	0.3 0.2	0.3 0.2
ID:BOISE	0.2 0.2	0.2 0.2	0.3 0.2
ID:IDAHO FALLS	0.3 0.2	NS	0.3 0.2
IL:CHICAGO	0.3 0.2	0.1 0.2	0.3 0.2
MI:LANSING	0.4 0.2	0.2 0.2	0.2 0.2
MS:JACKSON	0.2 0.2	NS	NS
ND:BISMARCK	0.4 0.2	0.2 0.2	0.2 0.2
NJ:TRENTON	0.3 0.2	NS	0.3 0.2
NV:LAS VEGAS	NS	NS	0.2 0.2
NY:NEW YORK CITY	0.3 0.2	0.2 0.2	0.2 0.2
NY:NIAGARA FALLS	0.3 0.2	0.3 0.2	0.6 0.2
OH:COLUMBUS	0.3 0.2	0.1 0.2	0.3 0.2
OH:PAINESVILLE	0.2 0.2	0.1 0.2	0.2 0.2
OR:PORTLAND	0.2 0.2	0.1 0.2	0.2 0.2
PA:HARRISBURG	0.3 0.2	0.3 0.2	0.3 0.2
PA:PITTSBURGH	NS	0.2 0.2	NS
SC:BARNWELL	NS	2.4 0.2	0.7 0.2
SC:COLUMBIA	0.5 0.2	0.5 0.2	0.3 0.2
TX:AUSTIN	0.2 0.2	0.4 0.2	NS
VA:LYNCHBURG	0.3 0.2	0.4 0.2	0.3 0.2

NS NO SAMPLE
s SIGMA COUNTING ERROR

Plutonium and Uranium in Airborne Particulates

Environmental radiation levels of plutonium and uranium are determined by the analyses of quarterly composite samples (air filters) collected from the continuously operating airborne particulate samplers. The number of continuously operating stations is being increased from the original 22 will eventually number 67 when all equipment is operational.

Analyses of the composited filters consist of ashing, separating by liquid ion exchange, and coprecipitation of the plutonium or uranium.

Concentration of the specific isotopes of plutonium-238, -239, and uranium-234, -235, and -238 are determined by alpha spectroscopy. The volume of air analyzed normally ranges from 25,000 to 40,000 m^3 for each quarterly composite.

Plutonium and uranium in airborne particulates data for July - September 1982 are shown for the 42 stations operating during this period in Table 9.

TABLE 9

PLUTONIUM AND URANIUM IN AIRBORNE PARTICULATES
JULY - SEPTEMBER 1982 COMPOSITES

LOCATION	^{238}Pu aCi/m^3 ± 2s	^{239}Pu aCi/m^3 ± 2s	^{234}U aCi/m^3 ± 2s	^{235}U aCi/m^3 ± 2s	^{238}U aCi/m^3 ± 2s
AL:MONTGOMERY	0.8 0.5	1.4 0.6	18.5 3.7	0.4 0.4	20.8 3.9
CA:BERKELEY	0.5 0.4	1.5 0.7	8.6 1.8	1.0 0.6	8.9 1.9
CA:LOS ANGELES	0.4 0.5	1.7 0.7	29.2 4.3	4.2 1.3	28.5 4.2
CT:HARTFORD	0.4 0.4	1.2 0.5	23.2 4.4	1.1 0.8	17.2 3.5
DE:WILMINGTON	0.2 0.5	2.8 0.9	11.8 2.1	0.0 0.3	11.1 2.0
FL:JACKSONVILLE	0.5 0.6	0.5 0.5	57.8 12.7	3.5 2.2	28.4 9.5
FL:MIAMI	0.6 0.4	1.0 0.5	23.6 3.7	0.9 0.5	22.8 3.6
HI:HONOLULU	0.1 0.5	1.1 0.7	7.3 2.0	1.0 0.7	6.0 1.8
IA:IOWA CITY	0.5 0.6	1.2 0.6	17.9 2.6	0.6 0.4	19.8 2.8
ID:BOISE	-0.3 0.4	3.5 1.0	42.4 8.1	5.9 2.2	42.0 8.0
ID:IDAHO FALLS	0.5 0.3	2.9 0.8	43.3 6.1	4.0 1.2	44.2 6.2
IL:CHICAGO	0.3 0.3	1.5 0.6	21.4 3.7	0.8 0.6	25.0 4.2
ME:AUGUSTA	0.9 0.6	1.4 0.7	18.2 3.3	0.8 0.5	14.0 2.7
MI:LANSING	0.7 1.3	3.4 1.6	19.1 5.2	0.4 0.7	16.5 4.7
MN:MINNEAPOLIS	0.7 0.4	1.9 0.7	19.5 2.9	0.9 0.5	19.2 2.9
MO:JEFFERSON CITY	0.6 0.6	1.2 0.8	17.3 2.8	1.8 0.7	15.1 2.6
MS:JACKSON	0.3 0.3	1.3 0.6	20.5 3.1	0.5 0.4	17.0 2.7
NC:CHARLOTTE	0.5 0.5	1.0 0.7	17.1 3.3	0.9 0.7	14.3 3.0
ND:BISMARCK	0.6 0.5	3.1 0.9	44.5 5.8	2.4 0.9	38.5 5.2
NH:CONCORD	-0.2 0.6	2.1 0.9	10.2 3.0	0.6 0.6	11.9 3.2
NJ:TRENTON	1.7 2.2	1.5 1.3	33.6 6.8	2.2 1.5	30.2 6.2
NV:LAS VEGAS	0.2 0.3	17.0 2.6	81.2 9.2	4.2 1.1	50.1 6.1
NY:ALBANY	1.2 1.1	2.4 1.4	30.3 5.4	0.4 0.5	31.4 5.6
NY:NEW YORK CITY	0.8 0.9	1.0 0.9	22.4 4.6	1.7 1.1	23.4 4.7
NY:NIAGARA FALLS	0.6 0.6	1.5 0.7	26.9 4.2	1.6 0.8	31.8 4.8
NY:SYRACUSE	0.4 0.4	2.5 0.9	34.0 4.6	1.9 0.7	31.6 4.3
OH:COLUMBUS	0.2 0.3	2.4 0.7	51.4 7.7	2.7 1.1	39.3 6.2
OH:PAINESVILLE	1.0 0.6	1.4 0.7	22.0 3.4	1.8 0.8	20.4 3.2
OH:TOLEDO	0.7 0.4	1.8 0.7	25.9 3.8	0.9 0.5	28.0 4.1
OR:PORTLAND	-0.2 0.4	0.6 0.4	15.7 3.2	2.6 1.1	11.9 2.7
PA:HARRISBURG	0.6 0.7	2.7 1.3	26.2 4.7	0.8 0.7	18.8 3.8
PA:PITTSBURGH	0.2 0.4	1.9 0.7	54.8 7.6	2.0 0.9	54.7 7.6
RI:PROVIDENCE	0.2 0.5	1.5 0.8	15.0 2.8	0.2 0.2	16.0 2.9
SC:BARNWELL	1.1 0.8	2.0 0.9	11.9 2.9	1.1 0.8	13.3 3.0
SC:COLUMBIA	0.3 0.5	1.3 0.6	30.5 4.3	2.3 0.8	24.9 3.7
SD:PIERRE	1.3 0.8	3.4 1.1	27.6 4.3	1.4 0.8	27.6 4.4
TX:AUSTIN	0.5 0.5	2.1 0.7	19.1 3.2	2.1 0.9	21.9 3.5
TX:EL PASO	0.2 0.8	0.6 0.6	34.1 5.4	2.7 1.2	34.5 5.4
VA:LYNCHBURG	0.1 0.4	1.6 0.6	141.9 15.9	4.9 1.2	8.6 1.7
WA:SEATTLE	0.7 0.5	0.9 0.5	10.3 2.2	1.2 0.7	9.8 2.2
WA:SPOKANE	0.5 0.4	1.5 0.6	31.3 4.8	1.2 0.7	30.5 4.7
WI:MADISON	0.6 0.6	1.1 0.5	12.5 2.8	0.2 0.4	11.4 2.6

THE ^{238}Pu AND ^{239}Pu CONCENTRATIONS REPORTED IN THIS TABLE HAVE BEEN ROUNDED.

s SIGMA COUNTING ERROR

Krypton-85

Krypton-85 is a long-lived noble gas with a half life of 10.8 years. It is released into the atmosphere by nuclear reactor operations, fuel fabrication, fuel reprocessing, and nuclear detonations. Krypton-85 also occurs naturally in minor quantities primarily from the neutron capture of stable krypton-84 as well as spontaneous fission and neutron-induced fission of uranium. Monitoring of krypton-85 in the atmosphere has been conducted to identify and establish baseline levels and long-term trends.

Krypton-85 analysis began in January 1973 with sample collections and analyses being performed for 12 sampling locations. These locations were selected to provide atmospheric coverage of the United States with considerations being given to the proximity to fuel reprocessing plants, nuclear reactors, and wide geographic coverage.

Dry compressed air samples, collected at each location, are purchased from commercial air suppliers annually and shipped to the EERF where the krypton-85 is cryogenically separated and counted in a liquid scintillation system.

The Kr-85 results will be published when they are available

ERAMS

SECTION II. Water Program

The ERAMS water program provides ambient radiation data to assess the effects of the nuclear power industry, the natural radiation environment, and other nuclear sources on the nation's rivers, streams and drinking water supplies.

Surface Water

Grab samples are taken quarterly at 58 stations located downstream from operating or future nuclear facilities.

Surface water monitoring consists of tritium analyses quarterly and gamma scans annually. Tritium is the primary radioactive pollutant from nuclear power plants.

Tritium concentrations are determined by liquid scintillation counting of distilled samples. Gamma scans are performed annually to determine if there is a buildup of other contaminants.

Tritium concentrations for surface water samples for October - December 1982 are given in Table 10.

TABLE 10

SURFACE WATER
TRITIUM CONCENTRATION

OCTOBER - DECEMBER 1982

LOCATION	SOURCE	DATE COLLECTED	nCi/l	± 2s
AL:DECATUR	TENNESSEE RIVER	10/ 5/82	0.5	0.2
AL:DOTHAN	CHATTAHOOCHEE R.	10/ 6/82	0.3	0.2
AL:SCOTTSBORO	TENNESSEE RIVER	10/ 4/82	0.4	0.2
CA:CLAY STATION	FOLSOM S. CANAL	10/ 7/82	0.4	0.2
CA:EUREKA	HUMBOLDT BAY	10/ 7/82	0.2	0.2
CO:GREELEY	SOUTH PLATTE RIVER	10/29/82	1.2	0.2
CT:EAST HADDAM	CONNECTICUT RIVER	10/28/82	1.5	0.2
CT:WATERFORD	LONG ISLAND SOUND	11/ 2/82	0.4	0.2
FL:CRYSTAL RIVER	GULF OF MEXICO	10/ 5/82	0.2	0.2
FL:FT. PIERCE	ATLANTIC OCEAN	10/ 5/82	0.2	0.2
FL:HOMESTEAD	BISCAYNE BAY	10/13/82	0.3	0.2
IA:CEDAR RAPIDS	CEDAR RIVER	10/ 5/82	0.4	0.2
ID:BUHL	SNAKE RIVER	10/15/82	0.5	0.2
IL:MARSEILLES	ILLINOIS RIVER	11/15/82	0.5	0.2
IL:MOLINE	MISSISSIPPI RIVER	11/15/82	0.2	0.2
IL:MORRIS	ILLINOIS RIVER	11/15/82	0.4	0.2
IL:OREGON	ROCK RIVER	11/15/82	0.2	0.2
IL:ZION	LAKE MICHIGAN	10/15/82	0.3	0.2
LA:NEW ORLEANS	MISSISSIPPI RIVER	10/ 6/82	0.3	0.2
MA:PLYMOUTH	CAPE CODE BAY	10/13/82	0.3	0.2
MA:ROWE	DEERFIELD RIVER	12/ 1/82	0.5	0.2
MD:CONOWINGO	SUSQUEHANNA RIVER	10/12/82	0.4	0.2
MD:LUSBY	CHESAPEAKE BAY	10/11/82	0.6	0.2
ME:WISCASSET	MONTSEWAY BAY	10/ 5/82	0.2	0.2
MI:BRIDGMAN	LAKE MICHIGAN	10/ 9/82	0.3	0.2
MI:CHARLEVOIX	LAKE MICHIGAN	10/ 8/82	0.4	0.2
MI:MONROE	LAKE ERIE	10/11/82	0.4	0.2
MI:SOUTH HAVEN	LAKE MICHIGAN	10/11/82	0.3	0.2
MN:MONTICELLO	MISSISSIPPI RIVER	10/21/82	0.2	0.2
MN:RED WING	MISSISSIPPI RIVER	10/15/82	0.5	0.2
MS:PORT GIBSON	MISSISSIPPI RIVER	10/21/82	0.3	0.2
NC:CHARLOTTE	CATAWBA RIVER	10/11/82	0.3	0.2
NC:SOUTHPORT	ATLANTIC OCEAN	10/ 5/82	0.2	0.2
NJ:BAYSIDE	DELAWARE RIVER	10/ 5/82	0.2	0.2
NJ:OYSTER CREEK	OYSTER CREEK	10/ 7/82	0.2	0.2
NY:OSSINING	HUDSON RIVER	11/17/82	0.3	0.2
NY:OSWEGO	LAKE ONTARIO	11/15/82	0.3	0.2
NY:POUGHKEEPSIE	HUDSON RIVER	10/ 7/82	0.3	0.2
OH:TOLEDO	LAKE ERIE	10/ 4/82	0.2	0.2
OR:BRADWOOD	COLUMBIA RIVER	10/31/82	0.3	0.2
PA:DANVILLE	SUSQUEHANNA RIVER	10/20/82	0.3	0.2
SC:ALLENDALE	SAVANNAH RIVER	10/21/82	4.0	0.3

TABLE 10 (CONTINUED)

SURFACE WATER
TRITIUM CONCENTRATION

OCTOBER - DECEMBER 1982

LOCATION	SOURCE	DATE COLLECTED	nCi/l	± 2s
SC:BROAD RIVER	BROAD RIVER	10/15/82	0.5	0.2
SC:HARTSVILLE	LAKE ROBINSON	10/11/82	0.7	0.2
TN:DAISY	TENNESSEE RIVER	12/14/82	0.6	0.2
TN:KINGSTON	CLINCH RIVER	11/ 4/82	1.1	0.2
TX:EL PASO	RIO GRANDE	10/14/82	0.5	0.2
VA:DOSWELL	NORTH ANNA RIVER	10/15/82	3.2	0.2
VA:NEWPORT NEWS	JAMES RIVER	12/21/82	0.6	0.2
VT:VERNON	CONNECTICUT RIVER	12/29/82	0.3	0.2
WA:NORTHPORT	COLUMBIA RIVER	11/ 9/82	0.4	0.2
WA:RICHLAND	COLUMBIA RIVER	10/11/82	0.3	0.2
WI:TWO CREEKS	LAKE MICHIGAN	10/26/82	0.5	0.2
WI:VICTORY	MISSISSIPPI RIVER	11/11/82	0.3	0.2
WV:WHEELING	OHIO RIVER	10/ 5/82	0.4	0.2

s SIGMA COUNTING ERROR

Drinking Water

The drinking water program provides ambient radiation monitoring relevant to the effects of the nuclear power industry, natural environmental levels, and other pertinent sources. These data serve to assess trends and anomalies in concentrations, and to compare with standards set forth in the EPA "National Interim Primary Drinking Water Regulations." These regulations provide for approval of supplies when the combined radium-226 and radium-228 levels do not exceed 5 pCi/l, when the gross alpha (excluding radon and uranium) levels do not exceed 15 pCi/l, when tritium levels do not exceed 20,000 pCi/l, when the strontium-90 levels do not exceed 8 pCi/l, and when the gross beta levels do not exceed 50 pCi/l.

Grab samples are taken at 78 sites which are either major population centers or selected nuclear facility environs.

The analyses include (a) tritium on a quarterly basis (b) gross alpha, gross beta, and strontium-90 on annual composites (gamma analyses are performed if the gross beta activity is greater than 10 pCi/l; radium-226 analyses are performed if the gross alpha exceeds 2 pCi/l; and radium-228 analyses are performed if the radium-226 activity falls between 3 and 5 pCi/l) (c) specific iodine-131 is performed on one quarterly sample per year for each station (d) an annual composite for plutonium-238, -239, uranium-234, -235, -238, on 22 selected sampling locations corresponding to continuously operating air particulate stations.

Tritium analyses are performed by scintillation counting of the distilled samples, gross beta, and gross alpha by evaporating an aliquot on stainless steel planchets for counting, and radium-226 by the standard emanation technique. Strontium-90 is determined by beta counting a strontium carbonate precipitate isolated by ion exchange.

The results of tritium in drinking water analyses for October - December 1982 are shown in Table 11.

All samples were taken as either a single grab sample or composite samples taken over 12 to 14 days.

TABLE 11

DRINKING WATER
TRITIUM CONCENTRATION

OCTOBER - DECEMBER 1982

LOCATION	DATE COLLECTED	nCi/l	± 2s
AK:FAIRBANKS	10/21/82	0.3	0.2
AL:DOTHAN	10/ 6/82	0.3	0.2
AL:MONTGOMERY	10/14/82	0.2	0.2
AL:MUSCLE SHOALS	10/ 5/82	0.3	0.2
AL:SCOTTSBORO	10/ 4/82	0.3	0.2
CA:BERKELEY	10/ 7/82	0.2	0.2
CA:LOS ANGELES	10/ 1/82	0.3	0.2
CO:DENVER	10/29/82	0.3	0.2
CO:PLATTEVILLE	10/29/82	0.3	0.2
CT:HARTFORD	10/20/82	0.4	0.2
DE:DOVER	10/ 6/82	0.2	0.2
FL:MIAMI	10/ 6/82	0.2	0.2
FL:TAMPA	10/18/82	0.3	0.2
GA:SAVANNAH	10/26/82	3.8	0.3
HI:HONOLULU	10/26/82	0.2	0.2
IA:CEDAR RAPIDS	10/ 5/82	0.2	0.2
ID:IDAHO FALLS	10/ 7/82	0.4	0.2
IL:MORRIS	10/ 4/82	0.2	0.2
IL:W. CHICAGO	10/ 4/82	0.2	0.2
KS:TOPEKA	10/22/82	0.2	0.2
LA:NEW ORLEANS	10/ 7/82	0.3	0.2
MA:LAWRENCE	10/ 4/82	0.3	0.2
MA:ROWE	12/ 1/82	0.2	0.2
MD:BALTIMORE	10/ 4/82	0.2	0.2
MD:CONOWINGO	10/12/82	0.2	0.2
ME:AUGUSTA	10/ 7/82	0.3	0.2
MI:DETROIT	10/15/82	0.4	0.2
MI:GRAND RAPIDS	10/11/82	0.4	0.2
MN:MINNEAPOLIS	10/ 1/82	0.3	0.2
MN:RED WING	10/15/82	0.2	0.2
MS:JACKSON	10/ 7/82	0.3	0.2
MS:PORT GIBSON	10/13/82	0.6	0.2
MT:HELENA	10/ 7/82	0.3	0.2
NC:CHARLOTTE	10/11/82	0.6	0.2
NC:WILMINGTON	10/ 6/82	0.3	0.2
ND:BISMARCK	10/ 1/82	0.3	0.2
NE:LINCOLN	12/30/82	0.4	0.2
NH:CONCORD	10/ 7/82	0.3	0.2
NJ:TRENTON	10/14/82	0.5	0.2
NJ:WARETOWN	10/ 7/82	0.2	0.2
NM:SANTA FE	10/ 5/82	0.3	0.2
NV:LAS VEGAS	10/ 7/82	0.3	0.2
NY:ALBANY	11/19/82	0.3	0.2
NY:NEW YORK CITY	10/13/82	0.2	0.2

TABLE 11 (CONTINUED)

DRINKING WATER
TRITIUM CONCENTRATION

OCTOBER - DECEMBER 1982

LOCATION	DATE COLLECTED	nCi/l	± 2s
NY:NIAGARA FALLS	11/ 4/82	0.4	0.2
NY:SYRACUSE	10/21/82	0.5	0.2
OH:CINCINNATI	11/15/82	0.2	0.2
OH:COLUMBUS	10/22/82	0.3	0.2
OH:EAST LIVERPOOL	11/ 9/82	0.4	0.2
OH:PAINESVILLE	10/ 6/82	0.3	0.2
OH:TOLEDO	10/ 4/82	0.4	0.2
OK:OKLAHOMA CITY	10/12/82	0.2	0.2
OR:PORTLAND	10/ 5/82	0.3	0.2
PA:COLUMBIA	10/14/82	0.4	0.2
PA:HARRISBURG	10/13/82	0.4	0.2
PA:PITTSBURGH	11/ 9/82	0.3	0.2
PC:ANCON	10/26/82	0.2	0.2
RI:PROVIDENCE	10/ 7/82	0.2	0.2
SC:BARNWELL	10/ 7/82	0.3	0.2
SC:COLUMBIA	10/ 7/82	0.4	0.2
SC:HARTSVILLE	10/11/82	0.2	0.2
SC:JENKINSVILLE	10/15/82	0.3	0.2
SC:SENECA	10/20/82	0.3	0.2
TN:KNOXVILLE	10/ 1/82	0.3	0.2
TX:AUSTIN	10/ 7/82	0.3	0.2
VA:DOSWELL	10/26/82	0.4	0.2
VA:LYNCHBURG	10/ 4/82	0.3	0.2
VA:VIRGINIA BEACH	10/ 4/82	0.3	0.2
WA:RICHLAND	10/11/82	0.7	0.2
WA:SEATTLE	10/ 4/82	0.2	0.2
WI:GENOA CITY	11/11/82	0.2	0.2
WI:MADISON	10/11/82	0.2	0.2

s SIGMA COUNTING ERROR

Radon-222 in Drinking Water

Radon-222 in drinking water has previously been considered a source of radiation exposure primarily from an ingestion standpoint. The Office of Radiation Programs (ORP) of the U.S. Environmental Protection Agency (EPA) is investigating radon in water supplies to evaluate the possibility that a major pathway from inhalation exposure may exist in addition to the ingestion pathway. As an inert gas, radon is not chemically bound to the water and consequently can be released during any operation that aerates or agitates water. Depending upon the initial concentration of radon in water, significant quantities of radon could be released in a home or to the general environment.

To determine the scope of this potential problem, a national ground water sampling program has been initiated by the Eastern Environmental Radiation Facility (EERF) to obtain data on radon concentrations in water supplies throughout the country. Sampling kits have been assembled by EERF and distributed to various state health departments. The kit is designed so that state personnel can collect samples from potable water supplies and ship them, without loss of radon other than radioactive decay, to EERF for analysis.

The selection of water supplies to be sampled is handled by two separate methods. Method 1 in which each state collects samples from all groundwater supplies serving at least 1000 people and Method 2 in which the choice of sampling locations and the number of supplies to be sampled is left to the discretion of the state programs. Each state is asked to obtain a representative sampling of ground water supplies within its boundaries. The extent of the sampling efforts and how representative the data are for a given state is determined primarily by the amount of time each state devotes to the program.

The concentrations of radon in water are determined at the EERF by liquid scintillation counting. The limit of detection for this technique using a 50-minute count and a 10-ml sample is 0.16 pCi or 16 pci/l.

The sampling kits are being provided to the various states on a rotating schedule. This schedule is designed to cover the U.S. within approximately two years.

Data will be published as it becomes available.

SECTION III. External Gamma Ambient Monitoring Program

The external gamma monitoring program, which began in October 1978, provides a continuous measurement of ambient gamma exposure rates, including cosmic, at selected sites throughout the continental United States. Data from this program will be used to evaluate fluctuations in natural background due to variations in environmental conditions and to provide a means of monitoring any significant increases in ambient gamma levels due to weapons fallout, reactor operations, etc. Initially, the program will consist of approximately 22 sites representing a wide geographic coverage throughout the country. Hopefully, at some later date additional sites will be added to the program. Although exposure measurements at these few sites are not totally representative of nationwide exposures, they will be indicative of national trends.

The monitoring program utilizes CaF_2:Mn thermoluminescent dosimeters (TLD's). These dosimeters are commercially available glass-bulb type dosimeters with energy compensating shields. A group of four TLD's is located at each station or site. Dosimeters are annealed by the station operator prior to positioning in the field. The dosimeters are returned to EERF for readout on an approximate one-month cycle. Several dosimeters are annealed by the station operator as controls and returned with the exposed field dosimeters to correct for any exposures accumulated during shipment.

Results from the period October - December 1982 are shown in Table 12.

TABLE 12

ENVIRONMENTAL GAMMA AMBIENT MONITORING PROGRAM

LOCATION	DATE RANGE	INTEGRATED EXPOSURE	EXPOSURE RATE	
		MR	MICRO R/HR ± 2 s *	
AL:MONTGOMERY	100482-110182	5.5	8.2	10.7
AL:MONTGOMERY	111282-120182	3.5	7.8	7.6
AL:MONTGOMERY	120182- 10383	6.1	7.7	7.4
CA:BERKELEY	100182-110182	3.8	5.2	18.4
CA:BERKELEY	110182-120182	7.3	10.1	8.5
CA:BERKELEY	120182-123182	4.4	6.1	8.5
CO:DENVER	100582-110382	10.3	14.8	3.5
CO:DENVER	110382-113082	6.3	9.7	4.9
CO:DENVER	113082- 10583	12.7	14.8	4.8
FL:ORLANDO	93082-102882	3.7	5.5	8.4
FL:ORLANDO	102882-112982	4.1	5.3	5.6
FL:ORLANDO	112982- 10783	5.4	5.8	9.2
ID:BOISE	100682-110882	9.1	11.5	5.8
ID:BOISE	120782- 10683	8.0	11.1	13.9
IL:CHICAGO	100582-102982	4.1	7.1	3.8
IL:CHICAGO	102982-120382	6.1	7.3	7.1
IL:CHICAGO	120382- 10483	5/2	6.7	4.8
ND:BISMARCK	100782-110582	6.1	8.7	6.1
ND:BISMARCK	110582-113082	5.3	8.9	4.1
ND:BISMARCK	113082- 10483	7.2	6.2	6.2
NJ:TRENTON	100882-110882	7.6	10.2	8.8
NJ:TRENTON	110882-120282	5.6	9.8	5.7
NJ:TRENTON	120282- 10783	8.2	9.5	4.5
NM:SANTA FE	100582-110482	9.8	13.5	9.8
NM:SANTA FE	110482-113082	8.2	13.2	7.4
NM:SANTA FE	113082- 10783	11.9	13.1	10.8
NV:LAS VEGAS	93082-110182	11.7	15.2	4.8
NV:LAS VEGAS	110182-113082	4.3	6.1	8.0
NV:LAS VEGAS	113082- 10383	5.1	6.2	28.0
NY:NEW YORK	100682-110582	5.6	7.7	5.1
NY:NEW YORK	110582-121482	7.5	8.0	7.1
NY:NEW YORK	121482- 12083	6.1	6.8	48.2
OH:COLUMBUS	100182-110182	5.3	7.1	8.4
OH:COLUMBUS	110182-120182	5.3	7.3	6.4
OH:COLUMBUS	120182- 10683	5.6	6.5	9.1
OK:OKLAHOMA CITY	102182-111982	5.3	7.6	14.8
OK:OKLAHOMA CITY	111982- 10383	9.0	8.3	3.5
OR:PORTLAND	100682-110482	5.2	7.5	10.9
OR:PORTLAND	110482-120282	4.4	6.5	13.1
OR:PORTLAND	120282- 10483	5.8	7.3	21.3
PA:HARRISBURG	100482-102882	3.6	6.2	6.0
PA:HARRISBURG	102882-112982	4.9	6.4	6.9
PA:HARRISBURG	112982-123082	4.4	6.0	22.6
PA:PITTSBURGH	100182-110382	9.7	12.3	3.7
PA:PITTSBURGH	110382-120382	7.6	10.5	4.7
PA:PITTSBURGH	120382- 10383	9.2	12.3	7.2

TABLE 12 (CONTINUED)

ENVIRONMENTAL GAMMA AMBIENT MONITORING PROGRAM

LOCATION	DATE RANGE	INTEGRATED EXPOSURE	EXPOSURE RATE	
		MR	MICRO R/HR ± 2 s *	
RI:PROVIDENCE	102182-111082	4.8	9.9	16.3
RI:PROVIDENCE	111082-121382	10.0	12.6	5.0
RI:PROVIDENCE	121382- 11383	7.5	10.1	6.9
SC:BARNWELL	102182-110482	2.4	7.2	6.0
SC:BARNWELL	120782- 11383	8.3	9.3	6.0
SC:COLUMBIA	100182-110182	6.5	8.8	5.8
SC:COLUMBIA	110182-113082	6.3	9.1	5.3
SC:COLUMBIA	113082- 10483	7.3	8.7	4.5
TN:KNOXVILLE	100182-110482	7.4	9.1	16.2
TN:KNOXVILLE	110482-113082	5.6	8.9	8.3
TN:KNOXVILLE	113082-123082	6.9	9.6	7.1
VA:RICHMOND	100482-110182	5.5	8.1	3.9
VA:RICHMOND	110182-120182	5.3	7.3	25.7
VA:RICHMOND	120182- 10383	6.0	7.6	7.1
VT:MONTPELIER	100482-110182	5.4	8.0	6.4
VT:MONTPELIER	110182-120382	5.5	7.2	5.5
VT:MONTPELIER	120382- 10483	6.2	8.1	6.6

* s = SIGMA COUNTING ERROR (IN PERCENT)

SECTION IV. Milk Program

Pasteurized Milk

This is a cooperative program of the EPA, ORP and the Dairy and Lipid Products Branch, Milk Sanitation Section, Food and Drug Administration. Milk is a reliable indicator of the general populations intake of radionuclides since it is consumed by a large segment of the population and contains several of the biologically important contaminants resulting from environmental releases from nuclear activities. A primary function of this program is to obtain reliable monitoring data relative to current radionuclide concentrations and determine any long-term trends.

Monthly samples are collected at 65 sampling sites with one or more located in each state, Puerto Rico, and the Panama Canal. These are composite samples representing more than 80 percent of the milk consumed in a given population center.

These samples are analyzed for iodine-131, barium-140, cesium-137, and potassium. All 65 samples are analyzed annually in July for strontium-89, and strontium-90. Also, for the first month of the three quarters beginning January, April and October, 10 regional composite samples of milk made up from the states within each of EPA's 10 regions are analyzed for strontium-89 and strontium-90.

Iodine-131, barium-140, cesium-137 and potassium are determined by gamma spectral analysis. Strontium-89 and strontium-90 are determined by beta counting a total strontium precipitate which has been chemically separated by ion-exchange.

The values from the pasteurized milk samples for October - December 1982 are shown in Tables 13 - 15.

Strontium values from regional composite samples collected October - December 1982 are shown in Table 16.

Tritium in Milk

It was previously proposed to analyze all 65 milk samples for tritium in the aqueous and organic phases, on an annual basis (on the April sample). The EERF is currently evaluating alternative analytical techniques anticipating that these analyses will begin during the coming year.

TABLE 13

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

OCTOBER 1982

LOCATION	DATE COLLECTED	K g/l±2s	^{137}Cs pCi/l±2s	^{140}Ba pCi/l±2s	^{131}I pCi/l±2s
AK:ANCHORAGE	10/ 4/82	1.55 0.24	14. 16.	6. 20.	-6. 14.
AL:MONTGOMERY	10/ 6/82	1.85 0.25	16. 16.	12. 20.	6. 14.
AZ:PHOENIX	10/14/82	1.67 0.17	0. 11.	0. 14.	-4. 10.
CA:LOS ANGELES	10/18/82	1.86 0.25	9. 16.	13. 20.	7. 14.
CA:SACRAMENTO	10/ 7/82	1.86 0.25	10. 16.	4. 20.	-6. 14.
CA:SAN FRANCISCO	10/ 6/82	1.59 0.24	4. 15.	3. 20.	0. 14.
CO:DENVER	10/29/82	1.72 0.24	5. 15.	4. 20.	-5. 14.
CT:HARTFORD	10/ 4/82	1.76 0.24	-1. 15.	6. 20.	-2. 14.
DE:WILMINGTON	10/ 6/82	1.55 0.24	9. 15.	14. 20.	-1. 14.
GA:ATLANTA	10/28/82	1.69 0.24	3. 15.	2. 20.	9. 14.
HI:HONOLULU	10/ 5/82	1.59 0.24	16. 16.	10. 20.	-4. 14.
IA:DES MOINES	10/11/82	1.76 0.17	7. 11.	3. 14.	5. 10.
ID:IDAHO FALLS	10/ 4/82	1.62 0.24	3. 15.	2. 20.	-3. 14.
IL:CHICAGO	10/ 4/82	1.72 0.17	5. 11.	13. 14.	-2. 10.
IN:INDIANAPOLIS	10/ 4/82	1.62 0.24	5. 15.	15. 20.	-2. 14.
KS:WICHITA	10/ 5/82	1.55 0.24	-6. 15.	4. 20.	1. 14.
KY:LOUISVILLE	10/ 5/82	1.63 0.17	0. 11.	12. 14.	4. 10.
LA:NEW ORLEANS	10/29/82	1.66 0.24	0. 16.	16. 21.	-14. 14.
MA:BOSTON	10/ 5/82	1.75 0.17	15. 11.	2. 14.	-4. 10.
MD:BALTIMORE	10/ 1/82	1.77 0.24	8. 15.	7. 20.	7. 14.
ME:PORTLAND	10/12/82	1.89 0.25	5. 15.	8. 20.	10. 14.
MI:DETROIT	10/ 4/82	1.76 0.24	9. 16.	18. 20.	0. 14.
MI:GRAND RAPIDS	10/ 5/82	1.61 0.24	10. 15.	3. 20.	6. 14.
MN:MINNEAPOLIS	10/ 4/82	1.47 0.24	-2. 15.	12. 20.	11. 14.
MO:KANSAS CITY	10/ 8/82	1.71 0.24	16. 16.	16. 20.	6. 14.
MO:ST. LOUIS	10/ 6/82	1.70 0.24	11. 16.	5. 20.	-2. 14.
MS:JACKSON	10/14/82	1.76 0.24	7. 15.	6. 20.	1. 14.
MT:HELENA	10/ 7/82	1.67 0.24	16. 16.	0. 20.	-5. 14.
NC:CHARLOTTE	10/ 4/82	1.74 0.24	7. 15.	3. 20.	0. 14.
ND:MINOT	10/11/82	1.70 0.24	11. 16.	11. 20.	4. 14.
NE:OMAHA	10/12/82	1.65 0.24	-2. 15.	14. 20.	6. 14.
NH:MANCHESTER	10/ 4/82	1.90 0.25	17. 16.	-4. 20.	7. 14.
NJ:TRENTON	10/ 7/82	1.75 0.24	2. 15.	-7. 20.	0. 14.
NY:BUFFALO	10/ 4/82	1.71 0.24	16. 16.	5. 20.	-2. 14.
NY:NEW YORK CITY	10/ 4/82	1.85 0.25	-2. 15.	10. 20.	-1. 14.
NY:SYRACUSE	10/ 6/82	1.80 0.17	10. 11.	10. 14.	2. 10.
OH:CINCINNATI	10/ 4/82	1.76 0.24	0. 15.	2. 20.	10. 14.
OH:CLEVELAND	10/ 6/82	1.58 0.24	6. 15.	10. 20.	0. 14.
OK:OKLAHOMA CITY	10/ 4/82	1.60 0.24	8. 15.	11. 20.	3. 14.
OR:PORTLAND	10/ 5/82	1.64 0.24	3. 15.	6. 20.	13. 14.
PA:PHILADELPHIA	10/ 4/82	1.86 0.25	5. 15.	12. 20.	3. 14.
PA:PITTSBURGH	10/ 6/82	1.86 0.25	4. 15.	-5. 20.	3. 14.
PC:CRISTOBAL	10/28/82	1.74 0.24	29. 16.	-1. 20.	8. 14.
PR:SAN JUAN	10/22/82	1.89 0.25	17. 16.	10. 20.	4. 14.

TABLE 13 (CONTINUED)

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

OCTOBER 1982

LOCATION	DATE COLLECTED	K g/l±2s	^{137}Cs pCi/l±2s	^{140}Ba pCi/l±2s	^{131}I pCi/l±2s
SC:CHARLESTON	10/20/82	1.82 0.25	8. 15.	9. 20.	0. 14.
SD:RAPID CITY	10/ 7/82	1.86 0.25	2. 15.	0. 20.	5. 14.
TN:CHATTANOOGA	10/ 4/82	1.76 0.24	6. 15.	-2. 20.	-3. 14.
TN:KNOXVILLE	10/ 4/82	1.81 0.24	12. 16.	-5. 20.	1. 14.
TN:MEMPHIS	10/28/82	1.81 0.25	7. 15.	15. 20.	1. 14.
TX:AUSTIN	10/ 6/82	1.83 0.17	7. 11.	4. 14.	-2. 10.
UT:SALT LAKE CITY	10/ 4/82	1.75 0.17	3. 11.	11. 14.	-3. 10.
VA:NORFOLK	10/14/82	1.70 0.24	7. 15.	5. 20.	1. 14.
VT:BURLINGTON	10/ 8/82	1.63 0.24	16. 16.	19. 20.	6. 14.
WA:SEATTLE	10/ 4/82	1.82 0.20	13. 14.	-2. 17.	1. 12.
WA:SPOKANE	10/ 4/82	1.64 0.24	13. 16.	-1. 20.	7. 14.
WI:MILWAUKEE	10/ 8/82	1.76 0.24	6. 15.	1. 20.	4. 14.
WV:CHARLESTON	10/21/82	1.55 0.24	11. 15.	0. 20.	6. 14.
WY:LARAMIE	10/ 6/82	1.74 0.24	16. 16.	-2. 20.	6. 14.

s SIGMA COUNTING ERROR

TABLE 14

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

NOVEMBER 1982

LOCATION	DATE COLLECTED	K g/l±2s	^{137}Cs pCi/l±2s	^{140}Ba pCi/l±2s	^{131}I pCi/l±2s
AL:MONTGOMERY	11/ 4/82	1.60 0.24	5. 15.	2. 20.	-8. 14.
AR:LITTLE ROCK	11/ 1/82	1.70 0.17	4. 11.	7. 14.	1. 10.
AZ:PHOENIX	11/ 9/82	1.86 0.25	9. 15.	-7. 20.	0. 14.
CA:LOS ANGELES	11/15/82	1.73 0.25	-8. 16.	-3. 20.	-2. 14.
CA:SACRAMENTO	11/ 3/82	1.58 0.24	12. 16.	3. 20.	-2. 14.
CA:SAN FRANCISCO	11/10/82	1.67 0.24	11. 15.	0. 20.	-2. 14.
CO:DENVER	11/26/82	1.82 0.25	-5. 16.	8. 20.	-14. 14.
CT:HARTFORD	11/ 1/82	1.79 0.24	12. 16.	6. 20.	2. 14.
DC:WASHINGTON	11/ 5/82	1.72 0.17	12. 11.	4. 14.	1. 10.
DE:WILMINGTON	11/ 5/82	1.72 0.24	7. 15.	6. 20.	2. 14.
HI:HONOLULU	11/ 3/82	1.67 0.24	6. 15.	15. 20.	2. 14.
IA:DES MOINES	11/15/82	1.75 0.24	3. 15.	14. 20.	1. 14.
ID:IDAHO FALLS	11/ 7/82	1.80 0.24	9. 15.	-3. 20.	8. 14.
IL:CHICAGO	11/ 1/82	1.67 0.24	16. 16.	4. 20.	5. 14.
IN:INDIANAPOLIS	11/ 8/82	1.63 0.24	0. 15.	1. 20.	0. 14.
KS:WICHITA	11/ 4/82	1.71 0.17	7. 11.	-1. 14.	0. 10.
KY:LOUISVILLE	11/ 2/82	1.73 0.24	9. 16.	10. 20.	9. 14.
LA:NEW ORLEANS	11/24/82	1.78 0.25	-15. 15.	2. 20.	-11. 14.
MA:BOSTON	11/ 9/82	1.76 0.24	7. 15.	-2. 20.	-3. 14.
MD:BALTIMORE	11/ 5/82	1.94 0.25	14. 16.	3. 20.	12. 14.
ME:PORTLAND	11/ 9/82	1.69 0.24	9. 15.	6. 20.	0. 14.
MI:DETROIT	11/ 8/82	1.62 0.24	11. 15.	-2. 20.	-3. 14.
MI:GRAND RAPIDS	11/10/82	2.00 0.25	15. 16.	10. 20.	-1. 14.
MN:MINNEAPOLIS	11/ 1/82	1.76 0.17	1. 11.	12. 14.	-1. 10.
MN:ST. PAUL	11/ 3/82	1.71 0.24	5. 15.	1. 20.	3. 14.
MO:KANSAS CITY	11/ 9/82	1.77 0.24	8. 15.	9. 20.	-5. 14.
MO:ST. LOUIS	11/ 3/82	1.61 0.24	5. 15.	5. 20.	-7. 14.
MS:JACKSON	11/ 8/82	1.80 0.24	-2. 15.	5. 20.	-5. 14.
MT:HELENA	11/ 9/82	1.72 0.24	7. 15.	-2. 20.	8. 14.
NC:CHARLOTTE	11/ 1/82	1.67 0.24	8. 15.	13. 20.	-3. 14.
ND:MINOT	11/ 8/82	1.91 0.25	7. 15.	-14. 20.	5. 14.
NE:OMAHA	11/15/82	1.55 0.24	-2. 15.	9. 20.	-1. 14.
NH:MANCHESTER	11/ 1/82	1.61 0.17	7. 11.	7. 14.	4. 10.
NJ:TRENTON	11/ 4/82	1.83 0.25	8. 15.	0. 20.	5. 14.
NV:LAS VEGAS	11/ 2/82	1.73 0.24	2. 15.	6. 20.	10. 14.
NY:BUFFALO	11/ 9/82	1.71 0.17	7. 11.	11. 14.	-6. 10.
NY:NEW YORK CITY	11/ 1/82	1.85 0.25	9. 16.	10. 20.	0. 14.
NY:SYRACUSE	11/ 8/82	1.68 0.24	-6. 15.	0. 20.	-1. 14.
OH:CINCINNATI	11/ 1/82	1.72 0.24	4. 15.	2. 20.	10. 14.
OH:CLEVELAND	11/ 8/82	1.78 0.24	6. 15.	-1. 20.	1. 14.
OR:PORTLAND	11/ 9/82	1.69 0.24	14. 16.	4. 20.	0. 14.
PA:PHILADELPHIA	11/ 8/82	1.67 0.24	11. 16.	2. 20.	3. 14.
PA:PITTSBURGH	11/ 3/82	1.77 0.25	-16. 15.	12. 21.	-9. 14.
PR:SAN JUAN	11/23/82	1.72 0.24	10. 16.	-6. 20.	-14. 14.

TABLE 14 (CONTINUED)

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

NOVEMBER 1982

LOCATION	DATE COLLECTED	K g/l±2s	^{137}Cs pCi/l±2s	^{140}Ba pCi/l±2s	^{131}I pCi/l±2s
SC:CHARLESTON	11/ 9/82	1.65 0.17	11. 11.	4. 14.	-2. 10.
SD:RAPID CITY	11/ 5/82	1.65 0.24	13. 16.	-1. 20.	5. 14.
TN:CHATTANOOGA	11/ 8/82	1.55 0.24	1. 15.	8. 20.	3. 14.
TN:KNOXVILLE	11/ 8/82	1.72 0.24	-3. 16.	-4. 20.	1. 14.
TN:MEMPHIS	11/18/82	1.77 0.25	-7. 16.	0. 20.	-8. 14.
TX:AUSTIN	11/17/82	1.66 0.24	1. 16.	3. 20.	-10. 14.
UT:SALT LAKE CITY	11/ 1/82	1.85 0.25	14. 16.	12. 20.	-3. 14.
VA:NORFOLK	11/15/82	1.55 0.24	6. 16.	3. 20.	-8. 14.
VT:BURLINGTON	11/ 5/82	1.76 0.24	-1. 15.	-12. 20.	3. 14.
WA:SPOKANE	11/ 1/82	1.74 0.25	-2. 16.	15. 21.	-7. 14.
WI:MILWAUKEE	11/ 1/82	1.82 0.25	9. 16.	4. 20.	-6. 14.
WV:CHARLESTON	11/ 9/82	1.70 0.24	5. 15.	14. 20.	-5. 14.
WY:LARAMIE	11/ 4/82	1.69 0.24	7. 15.	-8. 20.	11. 14.

s SIGMA COUNTING ERROR

TABLE 15

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

DECEMBER 1982

LOCATION	DATE COLLECTED	K g/l±2s	^{137}Cs pCi/l±2s	^{140}Ba pCi/l±2s	^{131}I pCi/l±2s
AK:ANCHORAGE	12/21/82	1.65 0.24	-5. 16.	11. 21.	-3. 14.
AL:MONTGOMERY	12/ 8/82	1.69 0.24	-4. 16.	-11. 20.	-13. 14.
AR:LITTLE ROCK	12/ 6/82	1.50 0.24	0. 16.	-8. 20.	-4. 14.
AZ:PHOENIX	12/ 9/82	1.80 0.25	0. 16.	6. 20.	-4. 14.
CA:LOS ANGELES	12/20/82	1.75 0.25	1. 16.	0. 20.	-7. 14.
CA:SACRAMENTO	12/ 2/82	1.79 0.25	6. 16.	-6. 20.	-6. 14.
CA:SAN FRANCISCO	12/ 7/82	1.65 0.24	-2. 16.	-5. 20.	-12. 14.
CT:HARTFORD	12/ 6/82	1.77 0.14	4. 9.	-15. 12.	-4. 8.
DC:WASHINGTON	12/ 3/82	1.77 0.18	-3. 11.	-2. 14.	-32. 21.
DE:WILMINGTON	12/ 3/82	1.72 0.24	-3. 16.	-10. 20.	-12. 14.
GA:ATLANTA	12/20/82	1.72 0.25	-1. 16.	6. 20.	-1. 14.
GA:ATLANTA	12/ 1/82	1.57 0.24	-11. 15.	-10. 20.	-11. 14.
HI:HONOLULU	12/ 7/82	1.69 0.17	5. 11.	1. 14.	-12. 10.
IA:DES MOINES	12/ 6/82	1.76 0.25	-3. 16.	-7. 20.	-6. 14.
ID:IDAHO FALLS	12/ 8/82	1.62 0.24	-1. 16.	-7. 20.	-13. 14.
IL:CHICAGO	12/ 6/82	1.69 0.24	2. 16.	-6. 20.	-7. 14.
IN:INDIANAPOLIS	12/ 6/82	1.64 0.24	1. 16.	-18. 20.	0. 14.
KS:WICHITA	12/17/82	1.91 0.18	-5. 11.	1. 15.	-7. 10.
KY:LOUISVILLE	12/ 6/82	1.71 0.24	-7. 16.	-10. 20.	-6. 14.
MA:BOSTON	12/ 7/82	1.57 0.24	-3. 16.	-17. 20.	-8. 14.
MD:BALTIMORE	12/ 3/82	1.77 0.25	4. 16.	3. 20.	-2. 14.
MI:DETROIT	12/ 9/82	1.66 0.24	0. 16.	3. 20.	-18. 14.
MI:GRAND RAPIDS	12/ 9/82	1.61 0.17	-4. 11.	-2. 14.	-10. 10.
MN:MINNEAPOLIS	12/13/82	1.66 0.24	-1. 16.	-4. 20.	-11. 14.
MN:ST. PAUL	12/ 1/82	1.57 0.24	-15. 15.	5. 20.	-3. 14.
MO:KANSAS CITY	12/10/82	1.83 0.25	-6. 16.	6. 20.	-17. 14.
MO:ST. LOUIS	12/ 8/82	1.70 0.24	-4. 16.	-5. 20.	-3. 14.
MS:JACKSON	12/ 6/82	1.56 0.24	-4. 16.	-12. 20.	0. 14.
MT:HELENA	12/ 8/82	1.73 0.17	-7. 11.	3. 15.	-7. 10.
NC:CHARLOTTE	12/ 6/82	1.81 0.25	-4. 16.	-7. 20.	-12. 14.
ND:MINOT	12/13/82	1.76 0.25	-7. 16.	4. 20.	-13. 14.
NE:OMAHA	12/10/82	1.52 0.14	3. 9.	-8. 12.	-8. 8.
NH:MANCHESTER	12/ 6/82	1.72 0.24	-6. 16.	-7. 20.	-12. 14.
NJ:TRENTON	12/ 2/82	1.79 0.18	-2. 11.	2. 14.	-7. 10.
NV:LAS VEGAS	12/13/82	1.75 0.18	0. 11.	-17. 14.	-1. 10.
NY:BUFFALO	12/ 6/82	1.78 0.17	-2. 11.	-16. 14.	-5. 10.
NY:NEW YORK CITY	12/ 6/82	1.77 0.25	-11. 16.	-10. 20.	-16. 14.
NY:SYRACUSE	12/ 6/82	1.61 0.24	-6. 16.	-7. 20.	0. 14.
OH:CINCINNATI	12/ 6/82	1.65 0.24	-2. 16.	-9. 20.	-10. 14.
OH:CLEVELAND	12/ 7/82	1.96 0.25	-7. 16.	-15. 20.	-10. 14.
OR:PORTLAND	12/ 7/82	1.82 0.18	0. 11.	-12. 14.	-6. 10.
PA:PHILADELPHIA	12/ 6/82	1.70 0.17	-2. 11.	-17. 14.	-2. 10.
PA:PITTSBURGH	12/ 8/82	1.79 0.25	-14. 15.	-10. 20.	3. 14.
PC:ANCON	12/16/82	1.60 0.24	13. 16.	2. 20.	-15. 14.

TABLE 15 (CONTINUED)

CONCENTRATIONS OF RADIONUCLIDES IN PASTEURIZED MILK

DECEMBER 1982

LOCATION	DATE COLLECTED	K g/l±2s	^{137}Cs pCi/l±2s	^{140}Ba pCi/l±2s	^{131}I pCi/l±2s
PR:SAN JUAN	12/14/82	1.63 0.24	-5. 16.	6. 20.	-9. 14.
SC:CHARLESTON	12/16/82	1.59 0.24	-3. 16.	-8. 20.	2. 14.
SD:RAPID CITY	12/ 7/82	1.70 0.24	1. 16.	4. 20.	-8. 14.
TN:CHATTANOOGA	12/ 6/82	1.90 0.25	-12. 16.	-13. 20.	-1. 14.
TN:KNOXVILLE	12/ 6/82	1.77 0.18	-8. 11.	-14. 14.	0. 10.
TN:MEMPHIS	12/29/82	1.78 0.25	-7. 16.	0. 20.	-5. 14.
TX:AUSTIN	12/ 6/82	1.78 0.25	-13. 16.	-4. 20.	-3. 14.
UT:SALT LAKE CITY	12/ 6/82	1.68 0.24	-5. 16.	-8. 20.	-9. 14.
VA:NORFOLK	12/10/82	1.75 0.25	-6. 16.	0. 20.	-2. 14.
VT:BURLINGTON	12/ 2/82	1.66 0.24	0. 16.	11. 21.	-7. 14.
WA:SEATTLE	12/ 6/82	1.97 0.25	-2. 16.	-3. 20.	-12. 14.
WA:SPOKANE	12/ 6/82	1.64 0.17	-5. 11.	-4. 14.	-2. 10.
WV:CHARLESTON	12/ 6/82	1.82 0.25	-11. 16.	-5. 20.	0. 14.
WY:LARAMIE	12/ 6/82	1.56 0.24	1. 16.	5. 20.	-9. 14.

s SIGMA COUNTING ERROR

TABLE 16

STRONTIUM-90 AND STRONTIUM-89 IN PASTEURIZED MILK

EPA REGIONAL COMPOSITES

OCTOBER - DECEMBER 1982

EPA REGION	^{90}Sr pCi/l ± 2s*	^{89}Sr pCi/l ± 2s
I	2.8 1.1	1. 2.
II	3.2 2.1	1. 5.
III	2.7 1.2	1. 2.
IV	3.3 1.1	1. 2.
V	3.2 1.2	1. 2.
VI	2.5 1.1	0. 3.
VII	2.5 2.8	2. 5.
VIII	2.4 3.0	-1. 5.
IX	1.8 2.2	-1. 5.
X	1.2 1.6	1. 4.

* s = SIGMA COUNTING ERROR

Carbon-14 in Milk

Nine stations, chosen for wide geographical distribution, contribute milk samples for annual analysis for carbon-14. These samples have monitored the carbon-14 levels in the food chain resulting from nuclear testing.

Analysis consists of combusting the samples and measuring released carbon dioxide through liquid scintillation.

Data will be published as it becomes available.

Radiological Health Laboratory
Indiana State Board of Health

Indiana Milk Analysis Program (I.M.A.P.)

In order to evaluate the fallout on Indiana pasturelands, the State has implemented a program whereby monthly milk samples from five geographical areas are sent to the Radiological Health Laboratory of the State Board of Health. The milk in these samples is bottled on the same date in all five areas to provide uniform time from pasture to the lab.

Once in the laboratory, the milk is first analyzed by gamma spectroscopy for iodine-131, barium-140, cesium-137, and potassium-40. A one gallon sample is analyzed on a 3" x 3" NaI(Tl) scintillation crystal for 4800 seconds. A background sample of 48,000 seconds is also run. The data are analyzed to give pCi/l for each radionuclide.

A quarterly composite sample is saved and run for strontium-89 and -90 by ion exchange method.

Data for the Third and Fourth Quarters of 1982 and the First Quarter of 1983 are shown in Table 17.

TABLE 17

INDIANA MILK ANALYSIS PROGRAM

(Third and Fourth Quarters of 1982; First Quarter of 1983)

Concentrations of Selected Gamma Radionuclides in Pasteurized Milk

	Location	Date	pCi/l I-131	pCi/l Ba-140	pCi/l Cs-137	g/l K
IN:	Evansville	7/82	3 ± 3	-3 ± 3	2 ± 4	1.52 ± .06
	Fort Wayne	7/82	1 ± 3	2 ± 3	5 ± 4	1.46 ± .06
	Indianapolis	7/82	4 ± 3	3 ± 3	7 ± 4	1.47 ± .06
	Rochester	7/82	1 ± 3	3 ± 3	2 ± 4	1.55 ± .06
	Seymour	7/82	-2 ± 3	2 ± 3	3 ± 4	1.52 ± .06
IN:	Evansville	8/82	-2 ± 3	2 ± 3	1 ± 4	1.68 ± .08
	Fort Wayne	8/82	-1 ± 3	0 ± 3	5 ± 4	1.47 ± .07
	Indianapolis	8/82	4 ± 3	4 ± 3	9 ± 4	1.66 ± .08
	Rochester	8/82	2 ± 3	0 ± 3	3 ± 4	1.75 ± .08
	Seymour	8/82	0 ± 3	5 ± 3	0 ± 4	1.64 ± .08
IN:	Evansville	9/82	1 ± 3	-4 ± 3	4 ± 4	1.46 ± .06
	Fort Wayne	9/82	5 ± 3	-3 ± 3	9 ± 4	1.36 ± .06
	Indianapolis	9/82	6 ± 3	-2 ± 3	11 ± 4	1.46 ± .06
	Rochester	9/82	2 ± 3	0 ± 3	3 ± 4	1.41 ± .06
	Seymour	9/82	-3 ± 3	-2 ± 3	3 ± 4	1.38 ± .06
IN:	Evansville	10/82	5 ± 3	-2 ± 3	13 ± 4	1.45 ± .06
	Fort Wayne	10/82	-1 ± 3	-3 ± 3	5 ± 4	1.41 ± .06
	Indianapolis	10/82	7 ± 3	0 ± 3	17 ± 4	1.46 ± .06
	Rochester	10/82	7 ± 3	-4 ± 3	7 ± 4	1.58 ± .06
	Seymour	10/82	5 ± 3	-2 ± 3	2 ± 4	1.31 ± .06
IN:	Evansville	11/82	2 ± 2	-3 ± 2	10 ± 3	1.48 ± .04
	Fort Wayne	11/82	5 ± 2	-2 ± 2	9 ± 3	1.44 ± .04
	Indianapolis	11/82	0 ± 2	-2 ± 2	9 ± 3	1.42 ± .04
	Rochester	11/82	3 ± 2	-2 ± 2	16 ± 3	1.45 ± .04
	Seymour	11/82	5 ± 2	-3 ± 2	14 ± 3	1.44 ± .04
IN:	Evansville	12/82	3 ± 2	-3 ± 2	7 ± 3	1.51 ± .04
	Fort Wayne	12/82	4 ± 2	-4 ± 2	8 ± 3	1.44 ± .04
	Indianapolis	12/82	4 ± 2	-4 ± 2	6 ± 3	1.43 ± .04
	Rochester	12/82	3 ± 2	-2 ± 2	9 ± 3	1.46 ± .04
	Seymour	12/82	3 ± 2	-3 ± 2	4 ± 3	1.43 ± .04
IN:	Evansville	1/83	2 ± 2	0 ± 2	7 ± 3	1.45 ± .04
	Fort Wayne	1/83	3 ± 2	-1 ± 2	10 ± 3	1.45 ± .04
	Indianapolis	1/83	3 ± 2	-1 ± 2	5 ± 3	1.37 ± .04
	*Rochester	1/83				
	*Seymour	1/83				

*Instrument Failure

TABLE 17 (CONTINUED)

IN:	Evansville	2/83	3 ± 2	-1 ± 2	6 ± 3	1.39 ± .04
	Fort Wayne	2/83	3 ± 2	0 ± 2	8 ± 3	1.36 ± .04
	Indianapolis	2/83	6 ± 2	1 ± 2	9 ± 3	1.40 ± .04
	Rochester	2/83	4 ± 2	0 ± 2	7 ± 3	1.45 ± .04
	Seymour	2/83	10 ± 2	-2 ± 2	12 ± 3	1.46 ± .04
IN:	Evansville	3/83	4 ± 2	-5 ± 2	5 ± 3	1.47 ± .04
	Fort Wayne	3/83	4 ± 2	-4 ± 2	9 ± 3	1.40 ± .04
	Indianapolis	3/83	2 ± 2	-2 ± 2	6 ± 3	1.38 ± .04
	Rochester	3/83	3 ± 2	-3 ± 2	7 ± 3	12.05 ± .04
	Seymour	3/83	2 ± 2	-2 ± 2	7 ± 3	1.44 ± .04

TABLE 17 (CONTINUED)

Concentrations of ^{89}Sr and ^{90}Sr in Pasteurized Milk

(pCi/l ± 2 Sigma Counting Error)

	Location	Date	^{89}Sr	^{90}Sr
IN:	Evansville	7/82	1 ± 8	2 ± 3
	Fort Wayne	7/82	-2 ± 11	5 ± 3
	Indianapolis	7/82	4 ± 7	2 ± 2
	Rochester	7/82	0 ± 8	5 ± 2
	Seymour	7/82	-1 ± 6	4 ± 2
IN:	Evansville	8/82	-3 ± 6	4 ± 1
	Fort Wayne	8/82	0 ± 5	2 ± 1
	Indianapolis	8/82	-7 ± 8	6 ± 2
	Rochester	8/82	0 ± 5	3 ± 1
	Seymour	8/82	0 ± 6	3 ± 1
IN:	Evansville	9/82	3 ± 4	2 ± 1
	Fort Wayne	9/82	3 ± 4	2 ± 1
	Indianapolis	9/82	4 ± 4	2 ± 1
	Rochester	9/82	2 ± 4	3 ± 1
	Seymour	9/82	2 ± 4	2 ± 1
IN:	Evansville	10/82	2 ± 11	1 ± 1
	Fort Wayne	10/82	-2 ± 11	2 ± 2
	Indianapolis	10/82	1 ± 15	2 ± 2
	Rochester	10/82	3 ± 13	3 ± 2
	Seymour	10/82	0 ± 14	4 ± 2
IN:	Evansville	11/82	3 ± 5	2 ± 1
	Fort Wayne	11/82	-1 ± 4	4 ± 1
	Indianapolis	11/82	-3 ± 5	2 ± 2
	Rochester	11/82	3 ± 8	2 ± 3
	Seymour	11/82	3 ± 5	2 ± 2
IN:	Evansville	12/82	1 ± 5	1 ± 1
	Fort Wayne	12/82	0 ± 5	2 ± 1
	Indianapolis	12/82	-3 ± 10	5 ± 3
	Rochester	12/82	0 ± 5	3 ± 1
	Seymour	12/82	1 ± 6	3 ± 2
IN:	Evansville	1/83	1 ± 6	3 ± 2
	Fort Wayne	1/83	-1 ± 5	3 ± 2
	Indianapolis	1/83	-2 ± 7	4 ± 3
	Rochester	1/83	-1 ± 6	5 ± 2
	Seymour	1/83	-2 ± 5	4 ± 2
IN:	Evansville	2/83	0 ± 3	2 ± 1
	Fort Wayne	2/83	-3 ± 5	4 ± 2
	Indianapolis	2/83	1 ± 5	2 ± 2
	Rochester	2/83	-1 ± 4	4 ± 1
	Seymour	2/83	0 ± 4	3 ± 1

TABLE 17 (CONTINUED)

IN:	Evansville	3/83	1 ± 4	2 ± 1
	Fort Wayne	3/83	2 ± 5	2 ± 1
	Indianapolis	3/83	2 ± 6	3 ± 2
	Rochester	3/83	1 ± 4	2 ± 1
	Seymour	3/83	3 ± 4	2 ± 1

Radiological Health Division
State Hygienic Laboratory of Iowa

Iowa Water Sampling Program

The radiological Health Division of the State Hygienic Laboratory of Iowa with the assistance of the State Department of Environmental Quality (DEQ) maintains a state-wide water sampling program of community drinking waters, surface waters and precipitation. All analyses with the exception of the sequential Ra-226, -228 analyses are performed according to "Standard Methods for the Examination of Water and Wastewater", 14th edition. The sequential analyses for radiums are performed according to the EPA publication, EPA-600/4-75-008, "Interim Radiochemical Methodology for Drinking Water."

The drinking water samples are collected by DEQ regional personnel and sent to the State Hygienic Laboratory where they are preserved with HCl. These waters are analyzed for gross alpha and gross beta radioactivity as a screening process. Subsequent analyses for Ra-226, Ra-228, Sr-90 are performed if screening levels are exceeded. Radium levels are of primary concern in Iowa drinking waters as those levels are elevated in deep geologic aquifers within the state.

Surface waters are collected at eleven sites throughout the state with site selection being determined by proximity upstream and downstream to nuclear power plants in Iowa or those plants discharging into rivers which are natural borders with adjoining states. Gross alpha, gross beta, and tritium are the routine radionuclide analyses for these samples. Strontium is of interest when gross beta screening levels are exceeded or if nuclear weapons testing necessitates monitoring to determine its impact on the environment.

Data will be published as it is received.

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Requests for information concerning publication and distribution of ERD should be directed to:

Charles M. Petko
Technical Support Branch
Eastern Environmental Radiation Facility
P. O. Box 3009
Montgomery, Alabama 36193

Requests for information concerning the operation of ERAMS should be directed to:

H. Michael Mardis, Chief
Monitoring and Analytical Services Branch
Eastern Environmental Radiation Facility
P. O. Box 3009
Montgomery, Alabama 36193

or to:

Lewis Battist, Chief
Environmental Studies and Statistics
Analysis and Support Division (ANR-461)
U. S. Environmental Protection Agency
Waterside Mall East
401 M Street, SW
Washington, DC 20460

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